

# PATENT SPECIFICATION

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## (54) FABRIC SOFTENING COMPOSITIONS

(71) We, PROCTER & GAMBLE COMPANY, a Corporation organised and existing under the laws of the State of Ohio, United States of America of 301 East Sixth Street, Cincinnati, Ohio 45202, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

The present invention relates to fabric softening compositions and, in particular, to the compositions in the form of an aqueous dispersion.

It has long been recognized that certain chemical compounds have the capability of imparting softness to textile fabrics. These compounds, which are known generally as "softening agents", "fabric softeners", or "softeners", have been used both by the textile industry and by housewives in the laundry to soften a finished fabric, thereby making the fabric smooth, pliable and fluffy to handle. In addition to the quality of softness, the fabrics frequently have a reduced tendency to static cling and are easier to iron.

The softening agents which are usually employed in compositions intended for use by the housewife are cationic surfactant compounds, commonly quaternary ammonium compounds having at least two long alkyl chains, for example distearyl dimethyl ammonium chloride. The positive charge on the softening compound encourages its deposition onto the fabric substrate, the surface of which is usually negatively charged.

However, although the above mentioned cationic compounds are highly effective softeners when applied in a rinse solution, there are certain disadvantages associated with their use. For example, the cationic compounds hav-

ing long alkyl chains are very sensitive to carry over of anionic detergent into the rinse. Thus, carry of anionic detergent tends to neutralize the softening effect because the anionic-cationic complex tends to precipitate out of solution. Also, certain cationic surfactant compounds are expensive and in short supply and it is therefore desirable, for commercial reasons, to provide softening compositions having a reduced amount of cationic surfactant compound. Furthermore, softening compositions which comprise predominantly long chain cationic compounds have the disadvantage that the treated fabrics tend to become overloaded with softener and become discolored, greasy or undesirably non-absorbent.

While certain nonionic compounds have been proposed as fabric softening agents, it has been found that these deposit only very inefficiently from aqueous solution because of their lack of positive charge, and in order to obtain effective utilization of such compounds it is necessary to use them in conjunction with an automatic clothes dryer. The relatively high temperature of the drying process assists the nonionic softener compound to spread over the fabric surface as a melt. It has not heretofore been possible to utilize such compounds effectively in a rinse-added softener composition.

It is an object of the present invention to provide softening compositions which employ nonionic softeners and which provide excellent deposition onto the fabric surface from aqueous dispersion.

Various compounds containing hydroxyl groups are recognized as useful fabric scrooping agents in aqueous media, e.g., those listed in Speel et al., *Textile Chemicals and Auxiliaries*, 2nd Edition, Reinhold Publishing Corp., 1957. Some ethoxylated alcohols are further known to be useful in textile lubri-

cating compositions (See Cohen, et al., U.S. Patent 3,773,463, issued November 20, 1973).

The use of various sorbitan ester compounds or derivatives to treat fabrics is known (see 5 Atlas Powder Company Bulletin No. 9, "Industrial Emulsions with Atlas Surfactants", 1953; Eisen, U.S. Patent 2,461,043, issued February 8, 1949; Simon et al., U.S. Patent 2,665,443, issued January 12, 1954; Karg, U.S. Patent 3,652,419, issued March 28, 1972 10 and Crossfield, U.S. Patent 3,827,114, issued August 6, 1974).

U.S. Patent 3,793,196, issued February 19, 1974 to Okazaki and Miamura, relates to a 15 softening composition in emulsion form, the active softening ingredients being a quaternary ammonium salt and a higher alcohol, and a nonionic emulsifier system comprising sorbitan fatty acid ester and polyoxyethylene alkyl ether 20 being used to stabilize and adjust the viscosity of the emulsion.

U.S. Patent 2,735,790, issued February 21, 1956 to Waitkus, discloses a relatively complex, 4-component system including nonionic 25 esters and a specific type of quaternary ammonium compound, the system being useful for treating polyacrylonitrile fibers.

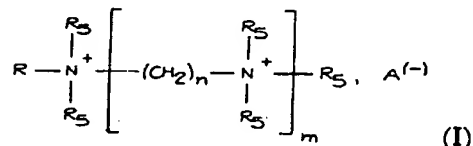
The U.S. Patent 4,022,938 relates to 30 articles for addition to a clothes dryer, the articles being impregnated with or otherwise containing sorbitan esters, or mixtures of sorbitan esters with cationic compounds. German Offenlegungsschrift 2,548,118, relates to 35 the use of particulate sorbitan esters in a composition for conditioning fabrics.

The present invention is based on the realization that the deposition of certain nonionic 40 softeners such as sorbitan or glycerol esters onto fabrics can be markedly increased if the softener is combined with certain cationic surfactant compounds in the form of a dispersion.

The present invention provides a textile treatment composition in the form of an 45 aqueous dispersion, comprising:

(a) a fabric substantive cationic compound or 50 compounds selected from:

(i) a substituted polyamine, a polyamine salt or a polyamine partial salt having the formula (in fully protonated or quarternised 55 form):



wherein R is an alkyl or alkenyl group 60 having 10 to 22 carbon atoms, the R<sub>s</sub> are independently selected from hydrogen, (C<sub>2</sub>H<sub>4</sub>O)<sub>p</sub>H, (C<sub>3</sub>H<sub>6</sub>O)<sub>q</sub>H and C<sub>1-3</sub> alkyl 65 group, where p and q are integers such that (p+q) does not exceed 25, m is from 1 to 9, n is from 2 to 6, and A<sup>(-)</sup> 70 represents an anion having total

charge balancing that of the nitrogen atoms, 60 and

(ii) polyamine salts having the formula I 65 wherein R is hydrogen or a C<sub>1-4</sub> alkyl group, each R<sub>s</sub> is hydrogen or a C<sub>1-4</sub> alkyl group, n is from 2 to 6 and m is not less than 3;

(b) a nonionic fabric softener that is a fatty 70 acid ester of a mono- or polyhydric alcohol or an anhydride thereof, said alcohol or anhydride having from 1 to 8 carbon atoms; and

(c) an aqueous carrier.

In a preferred embodiment of the inven- 75 tion, the composition additionally includes a cationic softener having two C<sub>12</sub>-C<sub>30</sub> alkyl chains.

The composition of the present invention 80 comprises components which are described more fully hereinafter. All percentages herein are by weight, unless otherwise specified.

The essential softening agent of the present 85 invention is a nonionic softener which is a fatty acid ester of a mono- or polyhydric alcohol or anhydride thereof, said alcohol or anhydride having from 1 to 8 carbon atoms. It is preferred that the fatty acid ester has 90 at least 1, more preferably at least 2, free (i.e. unesterified) hydroxyl groups and at least 1, more preferably at least 2, fatty acyl groups.

The mono- or polyhydric alcohol portion of 95 the ester can be represented by methanol, isobutanol, 2-ethylhexanol, isopropanol, ethylene glycol, glycerol, diglycerol, xylitol, sucrose, erythritol, pentaerythritol, sorbitol or sorbitan. Ethylene glycol, glycerol and sorbitan esters are particularly preferred.

The fatty acid portion of the ester normally 100 comprises a fatty acid having from 12 to 22 carbon atoms, typical examples being lauric acid, myristic acid, palmitic acid, stearic acid and behenic acid.

One highly preferred group of softening 105 agents for use in the present invention is the sorbitan esters, which are esterified dehydration products of sorbitol.

Sorbitol, itself prepared by the catalytic 110 hydrogenation of glucose, can be dehydrated in well known fashion to form mixtures of 1,4- and 1,5- sorbitol anhydrides and small amounts of isosorbides. (See Brown, U.S. Patent 2,322,821, issued June 29, 1943).

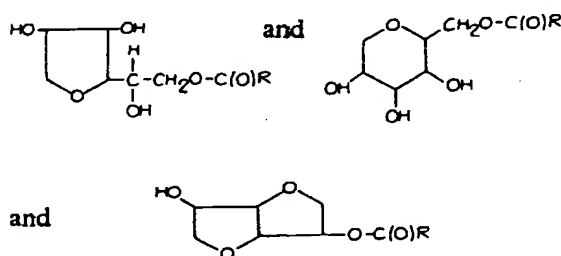
The foregoing type of complex mixtures of 115 anhydrides of sorbitol are collectively referred to herein as "sorbitan". It will be recognized that this "sorbitan" mixture will also contain some free, uncyclized sorbitol.

The softening agents of the type employed 120 herein can be prepared by esterifying the "sorbitan" mixture with a fatty acyl group in standard fashion, e.g., by reaction with a fatty acid halide or fatty acid. The esterification reaction can occur at any of the available hydroxyl groups and various

mono-, di-, etc., esters can be prepared. In fact, mixtures of mono-, di-, tri- etc., esters almost always result from such reactions, and the stoichiometric ratios of the reactants can be simply adjusted to favor the desired reaction product.

For commercial production of the sorbitan ester materials, etherification and esterification are generally accomplished in the same processing step by reacting sorbitol directly with fatty acids. Such a method of sorbitan ester preparation is described more fully in MacDonald; "Emulsifiers: Processing and Quality Control: *Journal of the American Oil Chemists' Society*, Volume 45, October 1968.

The mixtures of hydroxy-substituted sorbitan esters useful herein contain, *inter alia*, compounds of the following formulae, as well as the corresponding hydroxy-substituted di-esters:



wherein the group R is a  $C_{10}$ — $C_{22}$ , and higher, fatty alkyl residue. Preferably this fatty alkyl residue contains from 16 to 22 carbon atoms. The fatty alkyl residue can, of course, contain non-interfering substituents such as hydroxyl groups. Esterified hydroxyl groups can, of course, be either in terminal or internal positions within the sorbitan molecule.

The foregoing complex mixtures of esterified dehydration products of sorbitol (and small amounts of esterified sorbitol) are collectively referred to herein as "sorbitan esters". Sorbitan mono- and di-esters of lauric, myristic, palmitic, stearic and behenic (docosanoic) acids are particularly useful herein as softening agents and also can provide an anti-static benefit to fabrics. Mixed sorbitan esters, e.g., mixtures of the foregoing esters, and mixtures prepared by esterifying sorbitan with fatty acid mixtures such as the mixed tallow fatty acids, are useful herein and are economically attractive. Unsaturated  $C_{10}$ — $C_{22}$  sorbitan esters, e.g., sorbitan monooleate, usually are present in such mixtures in low concentration. The term "alkyl" as employed herein to describe the sorbitan esters encompasses both the saturated and unsaturated hydrocarbyl ester side chain groups.

Preparation of the sorbitan esters herein can be achieved by dehydrating sorbitol to form a mixture of anhydrides of the type set forth above, and subsequently esterifying the mixture using, for example, a 1:1 stoichiometry for the

esterification reaction. The esterified mixture can then be separated into the various ester components. Separation of the individual ester products is, however, difficult and expensive. Accordingly, it is easier and more economical not to separate the various esters, using instead the esterified mixture as the sorbitan ester component. Such mixtures of esterified reaction products are commercially available under various tradenames, e.g., Span (Registered Trademark). Such sorbitan ester mixtures can also be prepared by utilizing conventional interesterification procedures.

For the purposes of the present invention, it is preferred that a significant amount of di- and tri- sorbitan esters are present in the ester mixture. Ester mixtures having from 20%—50% mono-ester, 25%—50% di-ester and 10%—35% of tri- and tetra-esters are preferred.

The material which is sold commercially as sorbitan mono-ester (e.g. mono-stearate) does in fact contain significant amounts of di- and tri-esters and a typical analysis of sorbitan monostearate indicates that it comprises *ca.* 27% mono-, 32% di- and 30% tri- and tetra-esters. Commercial sorbitan mono-stearate therefore is a preferred material. Mixtures of sorbitan stearate and sorbitan palmitate having stearate/palmitate weight ratios varying between 10:1 and 1:10, and 1,5-sorbitan esters are useful. Both the 1,4- and 1,5- sorbitan esters are useful herein.

Other useful alkyl sorbitan esters for use in the softening compositions herein include sorbitan monolaurate, sorbitan monomyristate, sorbitan monopalmitate, sorbitan monobehenate, sorbitan monooleate, sorbitan dilaurate, sorbitan dimyristate, sorbitan dipalmitate, sorbitan distearate, sorbitan dibehenate, sorbitan dioleate, and mixtures thereof, and mixed tallowalkyl sorbitan mono- and di-esters. Such mixtures are readily prepared by reacting the foregoing hydroxy-substituted sorbitans, particularly the 1,4- and 1,5-sorbitans, with the corresponding acid or acid chloride in a simple esterification reaction. It is to be recognized, of course, that commercial materials prepared in this manner will comprise mixtures usually containing minor proportions of uncyclized sorbitol, fatty acids, polymers, isosorbide structures, and the like. In the present invention, it is preferred that such impurities are present at as low a level as possible.

It is also to be recognized that the sorbitan esters employed herein can contain up to about 15% by weight of esters of the  $C_{20}$ — $C_{26}$ , and higher, fatty acids, as well as minor amounts of  $C_8$ , and lower, fatty esters. The presence or absence of such contaminants is of no consequence in the present invention.

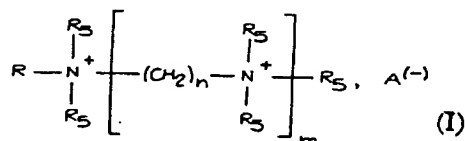
Other fatty acid partial esters useful in the present invention are xylitol monopalmitate, pentasorbitol mono-stearate, sucrose mono-

stearate, glycerol monostearate and ethylene glycol monostearate. As with the sorbitan esters, commercially available mono-esters normally contain substantial quantities of di- or tri-esters.

The glycerol esters are also highly preferred. These are the mono-, di- or tri-esters of glycerol and fatty acids of the class described above. Commercial glyceryl mono-stearate, which may contain a proportion of the di- and tri-stearates, is especially preferred.

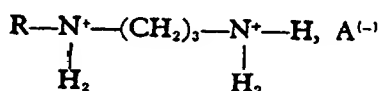
The above discussed nonionic compounds are correctly termed "softeners" because, when the compounds are correctly applied to a fabric, they do impart a soft, lubricious feel to the fabric. However, it has not heretofore been found possible to apply such compounds from a dilute, aqueous rinse solution to fabrics in such a way that adequate deposition is obtained. The present invention provides a means whereby good deposition of the above compounds can be achieved through their combination with certain cationic surfactants which are discussed in greater detail below.

One group of cationic compounds useful in the present invention is represented by substituted polyamine salts of the general formula:



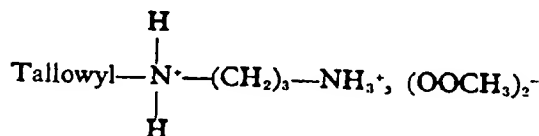
wherein R is an alkyl or alkenyl group having from 10 to 22, preferably from 12 to 20, especially from 16 to 18 carbon atoms, the groups  $R_S$ , which may be the same or different each represent hydrogen, a  $(C_2H_5O)_pH$  or  $(C_2H_5O)_qH$  or a  $C_1-C_3$  alkyl group where each p and q are numbers such that p+q does not exceed 25, n is an integer from 2 to 6, preferably 3, m is from 1 to 9, preferably from 1 to 4, and  $A^{(-)}$  represents one or more anions having total charge balancing that of the nitrogen atoms.

Especially preferred are the monosubstituted derivatives of 1,3-propane-diamine, that is compounds of the formula:



wherein R is as described above, and preferably is predominantly  $C_{16-18}$  alkyl, derived from tallow fatty acids. Optionally the N-hydrogen atoms may be ethoxylated with up to 25 ethoxy groups in all. When ethoxylated preferably from about 3 to 6 ethoxy groups in all are employed,  $A^{(-)}$  may represent a dihalide or any appropriate acidic radical such as the diacetate, or higher saturated or unsaturated acyl groups up to  $C_{22}$ . A preferred

compound of this class is believed to have the formula

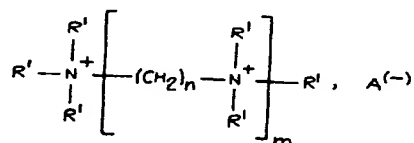


and is sold under the trade names Dinoramac (Messrs. Pierrefitte-Augy) or Duomac, (Registered Trade Mark, Armour-Hess), or more preferably the corresponding halide, especially chloride. "Tallowyl" represents the predominantly  $C_{16}$  to  $C_{18}$  alkyl groups derived from tallow fatty acids.

In the definition of these cationic compounds in the present invention, the compounds have been shown in fully protonated form. It will be understood that the degree of protonation depends on the pH of the composition. The present invention includes within its scope compositions containing polyamine compounds that are not fully protonated although it is highly preferred for good performance that the composition pH is such that at least one of the amine groups of the polyamine is present in the composition or at least in the treatment bath in protonated form.

Equally preferred is a diquaternary ammonium salt having the chemical name: N-tallow-N,N,N',N',N'-pentamethyl-1,3 propylene diammonium dichloride, which is commercially available under the tradenames: Stabiram MS-3 (Registered Trade Mark); Duoquad (Registered Trade Mark); and Adogen 477 (Ashland Co.).

Another class of suitable cationic surfactants herein includes polyamine salts (also frequently termed polyalkylene imine salts), if desired substituted which can be represented by the formula:



wherein  $R'$  represents hydrogen or a  $C_1-C_4$  alkyl group, n is an integer from 2 to 6, preferably from 2 to 4, most preferably 2, m is not less than 3, preferably from 6 to 24, especially from 8 to 16, and  $A^{(-)}$  is one or more charge-balancing anions.

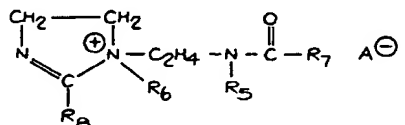
A preferred compound of this class is for instance a polyethylene iminium chloride containing about 10 ethylene imine units.

In many practical cases, it is advantageous to use a 3-component composition comprising the nonionic softener, the cationic compound as hereinabove defined and a cationic softener such as ditallowdimethyl ammonium chloride. In general, the cationic softener can be

selected from (a) quaternary ammonium compounds of the formula



wherein  $R_1$  and  $R_2$  are each  $C_{12}$ — $C_{20}$  fatty alkyl and  $R_3$  and  $R_4$  are each  $C_1$ — $C_4$  alkyl, (b) alkyl imidazolinium salts of the general formula



wherein  $R_5$  is a  $C_1$ — $C_4$  alkyl radical,  $R_7$  is a  $C_8$ — $C_{25}$  alkyl radical,  $R_6$  is a  $C_8$ — $C_{25}$  alkyl radical, and  $R_8$  is hydrogen or a  $C_1$ — $C_4$  alkyl radical, and (c)  $C_{12}$ — $C_{20}$  alkyl pyridinium salts, for example cetyl, pyridinium chloride.

Preferred 3-component compositions comprise from 5% to 60% of sorbitan ester, from 15% to 70% of polyamine salt; and from 15% to 70% of ditallowdimethylammonium chloride, these levels being expressed in respect to the ternary mixture disperse phase being 100%. Preferred polyamine salts are N-tallow-1,3-propylenediamine hydrochloride, and N-tallow- $N,N,N',N',N'$ -pentamethyl-1,3-propylene diammonium dichloride. In such compositions, the ratio of polyamine salt to sorbitan ester is preferably 12:1 to 1:4, especially from 4:1 to 2:3.

The compositions of the present invention are in the form of aqueous dispersions, and, preferably the disperse phase particles have an average particle size of less than 4 microns, preferably less than 2 microns, in order that effective deposition onto fabrics is achieved. The term "average particle size", in the context of this specification, means a number average particles size, i.e. 50% of the particles have a diameter of or less than the specified size.

In highly preferred embodiments of the invention, substantially all (i.e., at least about 80%) of the disperse phase comprises the above-discussed two components, namely (a) the nonionic softener and (b) one or more cationic surfactants. However, it is possible for the disperse phase to include other non-interfering components, for example other nonionic softeners. Such other components will then form the balance of the disperse phase after incorporation of the essential components discussed above.

Rinse additive compositions used at low concentrations have become widely employed as textile softeners in recent years, and the amount to be used has become conventional. If the present compositions are intended to be used in a rinse in these now conventional amounts, concentration of about 1—10% ester

Of course, if smaller amounts of product are intended to be used in treatment bath, e.g. a rinse, higher concentrations become appropriate.

In the actual treatment bath, e.g. the rinse liquor, a concentration of from about 10 parts per million (ppm) to about 1%, preferably about 50 to 500 ppm by weight of ester and cationic surfactant together is appropriate. Higher concentrations may be used in products intended to be sprayed neat onto fabrics.

In addition to the above described components the compositions may contain other textile treatment or conditioning agents. Such agents include silicones, as described in German Offenlegungsschrift 2,631,419, and dextrins, as described in German Offenlegungsschrift 2,724,816.

Adjuvants can be added to the composition herein at usual levels for their known purposes. Such adjuvants include emulsifiers, perfumes, preservatives, germicides, viscosity modifiers, colorants, dyes, fungicides, stabilizers, brighteners, and opacifiers. These adjuvants, if used, are added at their conventional low levels (e.g., from about 0.5% to 5% by weight). The present compositions should not, of course, contain any material (e.g. anionics) which chemically interferes with the functioning of the essential composition components.

Compositions of both the above types are prepared in aqueous dispersion and normally it is a simple matter of mixing the ingredients together in water, heating to a temperature of about 60°C and agitating for 5—30 minutes.

It is highly preferred and generally provides better performance, first to mix the cationic in the molten ester or mix both together in liquid form, and then disperse the mixture in the aqueous carrier medium with good agitation. This procedure usually leads to an aqueous emulsion having particles of an average size of less than 4 microns, the particles being positively charged at their surface. Depending upon the particular selection of nonionic softener and cationic surfactant, it may be necessary in certain cases to include other emulsifying ingredients (e.g. common ethoxylated alcohol nonionics) or to employ more efficient means for dispersing and emulsifying the particles (e.g. high speed blender).

Normally, at 60°C, the softening agents exist in liquid form and therefore form true emulsions with an aqueous continuous phase. On cooling, the disperse phase may wholly or partially solidify so that the final composition exists as a dispersion which is not a true liquid/liquid emulsion. It will be understood that the term "dispersion" means liquid/liquid phase or solid/liquid phase dispersions and emulsions.

For normal use as rinse-added compositions,

ferably 3—20%, more preferably 4—10% of the composition.

The following Examples illustrate the present invention.

#### EXAMPLE 1

An aqueous dispersion according to this invention was prepared containing 7% of tallowyl propanediamine hydrochloride and 5% of glycerol monostearate, the balance of the composition being water.

In a subjective softening test, fabrics rinsed in this composition were significantly preferred to fabrics rinsed in a control composition containing 12% of tallowyl propanediamine hydrochloride.

#### EXAMPLE 2

A composition according to this invention was prepared comprising, in aqueous dispersion, 4% of tallowyl propane diamine hydrochloride and 3.5% of glycerol monostearate (GMS).

For softening performance, this composition was significantly preferred over a control composition containing 5.8% of ditallowdimethyl ammonium chloride.

A composition according to this invention in which the amine hydrochloride was replaced by 4% tallowyl propane diamine performed slightly less well but still better than the above control composition.

It was found that control dispersions of glycerine monostearate alone produced practically no softening effect.

#### EXAMPLE 3

The following compositions according to this invention were prepared:

	Tallowyl propanediamine diacetate	GMS
	%	%
40	5	2.5
	4.5	3
	4	3.5
	3.5	4

#### EXAMPLE 4

The following compositions according to this invention were prepared:

	Tallowyl propanediamine hydrochloride	GMS	Silicone
	%	%	%
50	4	4	2
	4	5	2
	4	7	2

In Examples 3 and 4, optimum performance was obtained where the weight ratio of cationic to nonionic softener is close to unity.

#### EXAMPLE 5

A composition according to this invention comprising 4% tallowyl propanediamine hydrochloride and 3.5% glycerol monostearate was prepared in three ways. Compositions (a) and (b) had significantly better softening performance compared with a control composition containing 5.8% ditallowyl dimethyl ammonium chloride. Composition (c) was equal in performance.

- (a) Cationic dispersed in molten GMS and the mixture dispersed in water.
- (b) Diamine (not the salt) dispersed in molten GMS and the mixture dispersed in water containing enough hydrochloric acid to form the amine salt.
- (c) Cationic dissolved in water, then GMS dispersed in the solution.

#### EXAMPLE 6

A fabric softening composition according to this invention was prepared by mixing the following ingredients:

	% by weight	
N-tallow-N,N,N',N',N' pentamethyl-1,3 propylene diammonium dichloride (Duoquad 50% solution supplied by Armour-Hess)	4 (on 100% active basis)	85
Glycerol monostearate	3	
Polydimethylsiloxane (Dow Corning 346) viscosity 1000 cp (25°C) (emulsion of 60% siloxane in water in presence of a non-ionic emulsifier)	1.5	90
Minors + water	balance to 100	95

In preparing this composition, the Duoquad solution and the molten glycerol monostearate were premixed under stirring at a temperature of about 60—65°C. This premix was then dispersed in water at a temperature in the range of about 55°C—60°C, followed by dispersion, under vigorous agitation, of the silicone component.

This composition on introduction during the last laundry rinse cycle provides superior softening and outstanding ease of ironing benefits to fabrics compared with conventional rinse-softening compositions.

The substitution of the Duoquad component in the above composition of this invention by an equivalent level of Duomeen; N-tallow-1,3 propylenediamine hydrochloride (Duomeen chloride; "Duomeen" is a trade mark), or N-tallow-N,N',N' triethanol-1,3 propylene diamine hydrochloride provide substantially similar textile softening ease of



ironing and, in general, improved textile handling benefits.

The replacement of the glycerol monostearate in the above composition of this invention by an equivalent amount of a nonionic fabric conditioning agent selected from sorbitan monostearate, ethylene glycolmonostearate, diglycerolmonotallowate, xylitol monopalmitate, sucrose dioleate, erythritol diarachidate, pentaerythritolmonobehenate and a 1:2 molar mixture of glyceroltristearate and glycerolmonostearate provides superior textile softening and textile handling benefits inclusive of ease of ironing.

#### EXAMPLE 7

A fabric softening composition according to this invention was prepared by mixing the following ingredients:

	% by weight
20 Ditallowdimethylammonium chloride	3
Glycerol monostearate	3
Duoquad (Armour-Hess) 50% solution	1.5 (on 100% active basis)
25 Polydimethylsiloxane (Dow Corning 346) viscosity 1000 cps (25°C) (emulsion of 60% siloxane in water in presence of nonionic emulsifiers)	1.5
30 Minors + water	balance to 100%

This composition was prepared as described in example 6 with the ditallowdimethyl ammonium component being added to the premix.

This composition was compared in respect to fabric softening and ease-of-ironing to a conventional prior-art fabric softening composition containing 5.8% ditallowdimethylammoniumchloride. It appeared that textiles treated with the composition of this invention had a significantly better softness than fabrics treated with the conventional softener.

The composition of example 7 also exhibited superior ease-of-ironing by reference to the conventional softener.

#### EXAMPLE 8

The following softener composition according to this invention was prepared:

	% by weight
55 Ditallowdimethyl ammonium chloride	2.5
Duomeen chloride	2.0
Glycerolmonostearate	1.0
Glyceroltristearate	1.5

This composition provided superior softness

to fabrics, particularly at high residual anionic detergent carry over in the last rinse cycle (e.g. 30 ppm linear C<sub>12</sub>-benzene sulfonate).

In the complete specification of U.K. Patent Application No. 19548/78 (Serial No. 1,550,206) there is claimed a softening composition in the form of an aqueous dispersion, comprising:

(i) from 3% to 20% by weight of a disperse phase comprising

(a) at least 30% by weight of a fatty acid ester of a mono- or polyhydric alcohol or anhydride thereof containing from 1 to 8 carbon atoms; and

(b) at least 5% by weight of a cationic surfactant selected from non-cyclic monoquaternary ammonium salts having at least one optionally substituted, C<sub>12</sub>-C<sub>30</sub> alkyl chain, N-alkylpyridinium salts having from 12 to 20 carbon atoms in said alkyl group, and alkyl-substituted imidazolinium salts having at least one alkyl group of from 8 to 25 carbon atoms;

the particles of the disperse phase being characterized by an average particle size of less than 4 microns; and

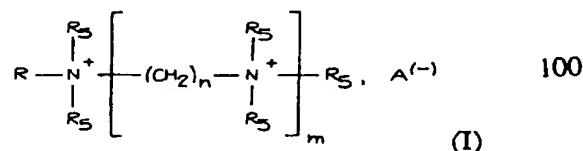
(ii) the balance of the composition comprising an aqueous liquid carrier.

#### WHAT WE CLAIM IS:—

1. A textile treatment composition in the form of an aqueous dispersion and comprising:

(a) a fabric substantive cationic compound or compounds selected from:

(i) a substituted polyamine, a polyamine salt or a polyamine partial salt having the formula (in fully protonated or quarternised form):



wherein R is an alkyl or alkenyl group having 10 to 22 carbon atoms, the R<sub>3</sub>'s are independently selected from hydrogen, (C<sub>2</sub>H<sub>5</sub>O)<sub>p</sub>H, (C<sub>3</sub>H<sub>7</sub>O)<sub>q</sub>H and C<sub>1-3</sub> alkyl groups, where p and q are numbers such that (p+q) does not exceed 25, m is from 1 to 9, n is from 2 to 6, and A<sup>(-)</sup> represents one or more anions having total charge balancing that of the nitrogen atoms, and

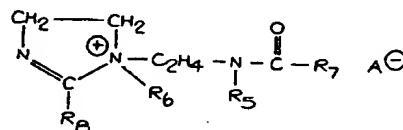
(ii) polyamine salts having the formula I wherein R is hydrogen or a C<sub>1-4</sub> alkyl group, each R<sub>3</sub> is hydrogen or a C<sub>1</sub>-C<sub>4</sub> alkyl group, n is from 2 to 6 and m is not less than 3.

- (b) a nonionic fabric softener that is a fatty acid ester of a mono- or polyhydric alcohol or an anhydride thereof, said alcohol or anhydride having from 1 to 8 carbon atoms; and
- 5 (c) an aqueous carrier.
2. A composition according to claim 1 wherein the nonionic fabric softener is a  $C_{10}-C_{28}$  fatty acid ester of a polyhydric alcohol.
- 10 3. A composition according to claim 2 wherein the fatty acid in the ester has from 12 to 22 carbon atoms.
- 15 4. A composition according to claim 2 or claim 3 wherein the said ester is a partial ester.
5. A composition according to claim 4 wherein the partial ester is sorbitan monostearate or glycerol monostearate.
- 20 6. A composition according to any one of claims 1-5 wherein the cationic compound is a substituted polyamine salt of formula I wherein R is a  $C_{12}-C_{20}$  alkyl group, m is 1, n is 3,  $A^{(-)}$  is an anionic radical having two negative charges, and  $R_s$  is selected from hydrogen, a  $C_{1-3}$  alkyl group, and an ethoxy group containing 1 or 2 ethylene oxide units.
- 25 7. A composition according to claim 6 wherein R is a  $C_{16}$  to  $C_{18}$  alkyl group.
- 30 8. A composition according to claim 7 wherein the substituted polyamine salt is selected from N-tallow-1,3 propylenediamine hydrochloride, N-tallow- $N,N,N',N'$  pentamethyl-1,3 propylene diammonium dichloride and N-tallow- $N,N',N'$  triethanol-1,3 propylene diamine hydrochloride.
- 35 9. A composition according to any one of claims 1-8 additionally comprising a cationic fabric softener selected from (a) quaternary ammonium compounds of the formula
- 40



wherein  $R_1$  and  $R_2$  are each  $C_{12}-C_{20}$  alkyl groups,  $R_3$  and  $R_4$  are each  $C_1-C_4$  alkyl groups and  $A^{\ominus}$  is an anion,

(b) alkyl imidazolinium salts of the general formula



wherein  $R_3$  is hydrogen or  $C_1-C_4$  alkyl,  $R_4$  is  $C_1-C_4$  alkyl,  $R_5$  is  $C_8-C_{25}$  alkyl,  $R_6$  is  $C_5-C_{15}$  alkyl and  $A^{\ominus}$  is an anion, and

(c)  $C_{12}-C_{20}$  alkyl pyridinium salts.

10. A composition according to claim 9 wherein the cationic fabric softener is a ditallowdimethyl ammonium salt.

11. A composition according to claim 9 or claim 10 wherein the disperse phase comprises from 5% to 60% by weight of the nonionic fabric conditioning substance, from 15% to 70% by weight of the fabric substantive cationic compound; and from 15% to 70% by weight of the cationic fabric softener.

12. A composition substantially as hereinbefore described with reference to Example 1 or 2.

13. A composition substantially as hereinbefore described with reference to any one of Examples 3-8.

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